

Photoreactivity of Wide Band Gap Semiconductor Nanostructures

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This research area focuses on characterizing the photoreactive properties of wide band gap metal oxide semiconductor materials, with a primary focus on titanium dioxide (TiO₂), in both thin film and nanoparticle form. These semiconductor materials can be utilized in a broad and diverse range of applications, including waste treatment, air purification, antimicrobial surfaces, chem/bioweapon decontamination and solar energy conversion. In addition, the ability of nanoparticle TiO₂ to function as a highly effective broadband UV absorber makes it an excellent candidate for the ultraviolet (UV) protection of polymeric materials. Current research involves the development of novel metrologies for measuring photoreactivity, and establishing relationships between the measured photoreactivity and the chemical, morphological and electrical properties of the nanostructured semiconductor materials.